Mercy Medical Center
Replacement Clinical Tower
Baltimore, Maryland

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Technical Assignment 3

Mercy

In care of the sick, great tenderness above all things.
- Catherine McAuley, Founder, Sisters of Mercy

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Executive Summary

The primary goal of technical assignment 3 is to identify potential areas of research, as well as alternative options for the building, potential value engineering ideas and possible schedule improvements. On October 24, 2007 the annual PACE workshop took place, which brought the industry and future employees together to discuss 3 major topic areas. The discussion was titled "Building Collaboration: Big Solutions to Big Problems", the topics discussed were Prefabrication within the industry, the use of Building Information Modeling, and the Changing Workforce. The discussion of these topics allowed for a better understanding of the construction industry and provided me with a foundation for my own research topics.

PACE Workshop

Session 1: Prefabrication

Can the U.S. adopt successful prefabrication techniques that are in use around the world?

- Faster Construction time
- Less Issues with quality control
- Longer lead time

Analysis of Discussion

The discussion of the prefabrication industry provided insight on the improvements that could be made about the industry. Prefabrication is more efficient, less expensive, and more convenient as compared to cast-in-place systems. The mercy medical system utilizes a cast-in-place system, due to the size of the building, site constraints, and ease of delivery to site. The discussion of prefabrication provided potential ideas for schedule reduction as well as price reduction, with respect to the structural system.

Session 2: Building Information Modeling

What primary motivators/success stories are helping to usher in the age of BIM?

- Real time decision making
- The BIM software allows for faster decision making
- Better communication between various aspects of the project
- Applying BIM technology
- Creating a Standard definition of BIM
- Educating the industry about the benefits of BIM

Analysis of Discussion

The discussion of the Building Information Modeling was interesting because, there were various opinions about what BIM actually was between the students, industry members as well as professors. BIM is seen as a real time communication between all aspects of the project. Many positives were discussed such as the ease of communication, reduction of change order which in turn could increase the amount of financial gain. The major positive was the ease of communication. This faster communication allows for faster decision making. As far motivators for the BIM method, the industry shows that although BIM shows many positives the construction industry has not accepted the method as a potential money-saver, or a potential time-saver. It was seen that many individuals were skeptible about the use of BIM. Whether or not it could be easily applied, and proficiently used. There were

questions from students about if BIM should be standardized among the various industries. This question was posed due to the inconsistency between companies. Not all companies will utilize BIM with the same vigor as others; also not all companies will the same education on the BIM method, which could possibly slow down the communication process which BIM is known for. Training for BIM could be a possible solution to the lack of interest in the BIM method. By educating the construction industry on the uses and the proper way to use the method to its full capacity, more industry members would be willing to take on more projects with the use of BIM.

Session 3: Workforce Collaboration

Creative techniques to address labor and management workforce challenges.

The discussion of workforce collaboration focused in the changing industry, with respect to immigration. The discussion also focused on trying to motivate individuals to join the construction industry.
Some major points covered included:

- Labor shortages
- Developing relationships with other trades
- Immigration impact on the workforce
- Accommodation of the new workforce
- Adding benefits to retain workers
- Expanding the employment search

Analysis of Discussion

This discussion was interesting because it dealt with a less tangible issue, the issue of the changing workforce. With the increase in immigration there is a need for more accommodations for the new individuals in the workforce, in order to keep the level of production in the industry at the same or higher level this needs to occur. An increase in bilingual programs will provide adequate training for both incoming employees as well as current employees. Both need to establish English and Spanish skills. Labor shortage is another issue discussed during the workshop. The construction industry is known as one of the most dangerous jobs of the workforce. This causes hesitation from potential candidates in the workforce. Parents of children do not portray the construction industry as a safe or proper occupation. The task is to create a better outlook on the construction industry to allow for more young individuals to join the construction industry. Establishing a positive perspective of the construction industry will not only draw in more workers but will also keep current workers. Keeping workers in the industry is also an issue. The use of off-job rewards will promote more motivation outside of work, and show the families of the workers that there are other benefits other than the obvious. The employment spectrum of the construction industry is generally limited. The industry reaches out to new graduates mainly in the United States, but not so often to those outside of the United States. Expanding the hires

will increase the number of employees hired and can potentially provide another perspective based on the difference in schooling practices. Overall I feel that the PACE workshop provided a better understanding of the current issues within the construction industry. It was beneficial to have industry members at the workshop to give multiple perspectives on the topics and to allow students to establish industry connections.

Critical Industry Topic

Women in the construction Industry

The field of construction over the past years has had an increase in the number of women in the industry. Although the numbers are increasing, there is still a shortage of women in the industry. This could be due to the lack of appeal of the construction industry, the fact that it is a male dominated industry, or that the construction industry isn't typically seen as an area where females flourish. As the issue of labor shortages continues to affect the industry more and more companies are looking to hire females.

Problem Identification

What are ways more women be recruited for the construction industry? How can women be retained in the construction industry? Why is the construction industry seen as unappealing to women?

Proposed Solution

Educating girls about the industry and the opportunities available will increase the number of women interested. Providing peer-to-peer support through mentoring opportunities, will establish a relationship between those already within the industry and those considering entering the industry. Creating programs for entry-level female engineers, such as apprenticeships will give them a more stable environment when starting out.

Research Steps

1. Analyzing the trend of women in the construction industry
2. Identifying reasons for the trend
3. Consulting industry members about ways to increase the number women the industry
4. Interviewing women in the construction industry about their experience within the industry.

Outside Information Required

Opinions from individuals within the industry will be required.

Data Collection Tool

A survey will be used to establish a better understanding of the issue of women in the construction industry. The target audience will be women in the construction industry and those hiring women for entry-level positions. The survey will ask the same questions for both groups, and the data collected from the surveys will be analyzed both separately and as a whole.

Technical Problem Analysis

Problem 1: Effective Air circulation within the hospital environment

Due to the fact that hospital already has operating facilities surrounding the proposed site, it is very important to maintain a level of active circulation in and around the site area for patients and pedestrians. Cross contamination from outside air and debris can cause the mechanical systems of the existing buildings to be less effective in filtering.

Problem Identification

How can cross contamination be reduced or eliminated? What are the major causes of cross contamination? What codes or laws are in place concerning construction and debris from the site? Do all parties of the construction process examine the possibility of cross contamination?

Proposed Solution

Onsite temporary ventilation systems could be provided to reduce the level of dangerous particles being circulated in the hospital setting. The system would allow for pedestrians and patients to freely enter adjacent buildings as well as provide onsite workers better air quality.

Research Steps

1. Analyze OSHA expectations for both the construction industry ventilation and the hospital facility ventilation, and compare the two.

2. Establish similarities and differences between the two, and create a Venn diagram to show them.

3. Fill in the differences between the two, to create a unified way of effectively ventilated the site.

Outside Information Required

Basic information concerning both the OSHA requirements for site ventilation as well as OSHA requirements for hospital ventilation.

Problem 2:Congested Site Analysis

A critical issue in the construction industry is the efficient layout of the construction site. This is particularly on a congested site such as the mercy medical center located in Baltimore city, Maryland. The site poses many potential problems with the delivery of materials, as well as crane location. Another problem is parking spaces for the onsite workers as well as storage space onsite. Keeping the overall circulation of the downtown area is essential to have a smooth construction process as well as keeping adjacent buildings and customers content. The downtown Baltimore area provides multiple obstacles for the contractor. Establishing an efficient layout for all aspects of the building is a very challenging. The building is within existing conditions and is in the place of the demolished parking garage.

Problem Identification

How can site congestion be minimized without sacrificing the efficiency of surrounding buildings and transportation? In what ways can disputes between the contractor and the adjacent building owners be reduced? What ways can on site transportation be applied to create a union between the existing roadways and the new construction layout? In what ways the can pedestrian access be made safer, and more efficient? The construction site is one of the major components of the building process. Establishing a good site can reduce on site prices as well as make operation on site and adjacent to the site efficient. Researching the layouts of congested site plans as well as looking at the renovations of hospitals with respect to the transport of pedestrians and patients in the building and around the building.

Proposed solution

Providing guidelines a code for site congestion. Each level of congestion will have designated regulations. These regulations will be based on previous site plans.

Research Steps

1. Identifying similar site plans and areas and look at all problems and issues faced during those problems.
2. Analyze the various problems with the different levels of congestion
3. Creating different codes for each level of congestion and applying it to real life situations.
4. Creating ways to reduce the amount of danger on site, and the amount of congestion on site
5. Applying the techniques to the mercy medical center to create a better construction site.

Outside Information Required

1. Information concerning adjacent buildings and how they are affected by the construction process.

2. Vehicle and pedestrian circulation through downtown Baltimore city, Maryland.

Expected Outcomes

The expected outcome will be a scaled chart with different levels of site congestion. The chart will show the conditions for each site condition and will have a breakdown of the steps that are needed to create a better site plan.

Problem 3:Structural System Analysis

The use of a cast-in place system allows for a more accurately constructed building, but precast could allow for a reduction in overall schedule. The cast-in-place raises more issues due to the area the building is being constructed in as well as the potential weather conditions under which the building is constructed. The curing process for the cast-in-place can be greatly affected by the weather, because it is not a controlled environment. A precast system can eliminate this problem completely because, all components are constructed in a controlled environment. The controlled environment creates a better product and a readily available product, which can reduce the schedule of the project.

Problem Identification

Analyzing ways to reduce the schedule of the project.

Proposed Solution

Applying the precast system to the Mercy Medical Center can effectively reduce the project schedule.

Research Steps

1. Identify the various pros and cons of using a precast system versus a cast-in-place system

2. Create a proposed schedule using the precast system, and compare the new schedule to the previous schedule.

Outside Information required

The information required will be analyses of both systems, as well as their prospective histories within the construction industry.

Expected Outcome

An effective method to reduce the schedule of the project as well as provide potential cost savings. The method will be shown through the use of comparison tables as well as a new project schedule and project cost analysis.

VALUE ENGINEERING

- Establishing a more effective ventilation system can create future cost savings with respect to maintenance

CONSTRUCTABILTY REVIEW

- Analyzing the mechanical systems, to see how effective they are at ventilating the hospital.

SCHEDULE REDUCTION

- Precast system versus the cast-in-place system.
- Improving site congestion makes better conditions for material delivery.

Weight Matrix

The weight matrix is a breakdown of how my research of the topics will be completed.

Description	Research	Value Eng.	Const. Rev	Sched. Red	Total
Critical Research Topic	30%				30%
Site Congestion	15%			15%	30%
Hospital Ventilation	20%	5%	5%		30%
Structural Analysis				10%	10%
	65%	5%	5%	25%	100%

Note: The critical Research issue and technical analyses will be further developed as the semester progresses.